

THE CLAIMS

1. In a communication system comprising at least one telephone switch and at least one communication device: means for providing a virtual phone generic configurable interface serving as a protocol interpreter of the protocol of said telephone switch thereby enabling communication between said switch and said communication device.

2. A system according to claim 1, wherein said means for providing a virtual phone generic configurable interface comprises means for providing a set of virtual phone data structures for representing the state of a phone as known to the telephone switch at any given time.

3. A system according to claim 1, wherein said means for providing a virtual phone generic configurable interface comprises means for providing a virtual phone application program interface for providing data communication between said telephone switch and said communication device.

4. A system according to claim 1, wherein said means for providing a virtual phone generic configurable interface comprises means for providing a communications protocol for the transfer of phone control information between said telephone switch and said communication device.

5. A system according to claim 1, wherein said means for providing a virtual phone generic configurable interface comprises:

a) means for providing a set of virtual phone data structures for representing the state of a phone as known to the telephone switch at any given time; and

b) means for providing a program interface for accessing said data structures.

6. A system according to claim 5, wherein said means for providing a program interface for accessing said data structures comprises a virtual phone application program interface for providing data communication between said set of virtual phone data structures and said switch and said communication device.

7. In a telephone communication system comprising at least one telephone switch, at least one telephone and a computer for processing applications related to the operation of said telephone switch and said telephone: means for providing a virtual phone generic configurable interface serving as a protocol interpreter between protocols of said telephone switch and protocols of said applications.

8. A system according to claim 7, wherein said means for providing a virtual phone generic interface comprises:

a) an internal virtual phone application program interface for providing data communication between said set of virtual phone data structures and said telephone switch and said telephone; and

b) means for providing a program interface for accessing said data structures; and

9. A system according to claim 8, wherein said means for providing a program interface for accessing said data structures comprises:

b) an external virtual phone application program interface for providing data communication between said external virtual phone application program interface and said computer.

11. In a telephone communication system comprising at least one telephone switch, at least one telephone and an external application device, a virtual phone interface comprising:

b) means for providing a set of symmetric functions for transferring data between said virtual phone data structures and said telephone switch and said telephone and between said virtual phone data structures

and communications medium associated with said external application device, said set of functions being the sole means by which said virtual phone data structures are changed:

c) means for providing communication between said set of symmetric functions and said telephone switch and said telephone; and

d) means for providing communication between said set of functions and said communications medium associated with said external application device.

12. A virtual phone interface according to claim 11, wherein said external application device comprises a computer.

13. A virtual phone interface according to claim 7, wherein said means for providing a set of symmetric functions comprises:

a) an internal virtual phone application program interface for providing data communication between said set of virtual phone data structures and said telephone switch and said telephone; and

b) an external virtual phone application program interface for providing data communication between said set of virtual phone data structures and said external application device.

14. A virtual phone interface according to claim 13, further including a communications medium for providing communication between said external virtual phone

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application program interface and said external application device.

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15. A method for providing communication in a system comprising at least one telephone switch and at least one communication device, said method comprising the steps of:

a) providing a virtual phone generic configurable interface to serve as a protocol interpreter of the protocol of said telephone switch; and

b) utilizing said virtual phone generic configurable interface to enable communication between said telephone switch and said communication switch; and

16. A method according to claim 15, wherein said step of providing a virtual phone generic configurable interface comprises providing a set of virtual phone data structures for representing the state of a phone as known to the telephone switch at any given time.

17. A method according to claim 15, wherein said step of providing a virtual telephone generic configurable interface comprises providing a virtual phone application program interface for providing data communication between said telephone switch and said communication device.

18. A method according to claim 15, wherein said step of providing a virtual phone generic configurable interface comprises:

a) providing a set of virtual phone data structures for representing the state of a phone as known to the telephone switch at any given time; and

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19. A method according to claim 18, wherein said step of providing a program interface for accessing said data structures comprises providing a virtual phone application program interface for providing data communication between said set of virtual phone data structures and said switch and said communication device.

a) providing a set of virtual phone data structures representing the state of said one or more telephones at any given time;

c) ~~changing~~ said data structures in response to commands issued by said external device.

21. A method according to claim 20, further including changing said data structures in response to events in said telephone switch and in said one or more telephones.

22. A method according to claim 21, further including providing a set of symmetric functions with issue function calls for accessing said data structures from said external

device and from said telephone switch and said one or more telephones.

23. A method according to claim 20, wherein said step of changing said data structures in response to commands issued by said external device comprises:

- a) receiving a command from said external device;
- b) calling a symmetric function in response to said command to provide a function call;
- c) converting the function call to a command format in accordance with a specific virtual phone integration to change one or more of said data structures; and
- d) passing said command format to said telephone switch.

24. A method according to claim 21, wherein said step of changing said data structures in response to events in said telephone switch comprises:

- a) receiving a packet from said telephone switch;
- b) utilizing data in said packet to call a symmetric function;
- c) updating one or more of said data structures by means of a function call issued by said symmetric function; and

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d) passing information on said updating to said external device.

25. A method for representing features of any type of one or more digital telephones independent of the type of telephone switch operatively associated with said one or more telephones and independent of the number of features in said one or more telephones comprising the steps of:

a) providing a set of virtual phone data structures representing the state of the digital telephone as known to the telephone switch at any given time;

b) providing an external processor for generating applications related to operations of said telephone switch and said one or more telephones;

c) changing said data structures in response to events in said telephone switch and in said one or more telephones; and

d) changing said data structures in response to commands issued by said processor related to said applications.

26. A method according to claim 25, further comprising:

a) transferring information to said external processor relating to changes in said data structures in response to events in said telephone switch and in said one or more telephones; and

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b) transferring information to said telephone switch relating to changes in said data structures in response to commands issued by said processes.

27. A method according to claim 25, further including providing a set of symmetric functions which issue function calls for accessing said data structures from said external processor and from said telephone switch and said one or more telephones.

28. A method according to claim 27, wherein said data structures can be changed only via said set of symmetric functions.

29. In a communication system comprising at least one communication switch and at least one communication device: a media control proxy serving as a gateway between said communication switch and said communication device to bridge any gap in communication protocols between said communication switch and said communication device thereby enabling communication between said communication switch and said communication device.

30. A system according to claim 29, wherein said media control proxy includes means for converting a fixed control protocol of an original connection between said communication switch and said communication device to a communications method for supporting any given communication device.

31. A system according to claim 29, wherein a first data bearer channel and a first control channel each are connected to said communication switch and to said media control proxy and a second data bearer channel and a second

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control channel are connected to said media control proxy and to said communication device.

sub 947 32. A system according to claim 31, wherein said media control proxy includes means for passing through data on said first and second data bearer channels.

33. A system according to claim 31, wherein said media control proxy includes means for processing information on said first and second control channels for conversion to a protocol understood by said communications device.

34. A method for providing communication in a system comprising at least one communication switch and at least one communication device, said method comprising the steps of:

- a) providing a media control proxy to serve as a gateway between said communication switch and said communication device to bridge any gap in communication protocols between said communication switch and said communication device; and
- b) utilizing said media control proxy to enable communication between said communication switch and said communication device.

35. A method according to claim 34, wherein said step of providing a media control proxy comprises connecting a fixed control protocol of an original connection between said communication switch and said communication device to a communications method for supporting any given communication device.

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37. A method according to claim 34, wherein said step of providing a media control proxy comprises processing control information from said communication switch for conversion to a protocol understood by said communication device.

38. A method according to claim 34, wherein said step of providing a media control proxy comprises interpreting control information received from said communication switch and maintaining the state of the communication device as defined by the communication switch.

39. A method according to claim 34, wherein said step of providing a media control proxy comprises transmitting data to said communication switch on a control channel between said media control proxy and said communication switch in a protocol native to said communication switch so that said communication switch interprets a message from said media control proxy as a message from said communication device.

40. A computer readable memory device encoded with a data structure for providing a virtual phone generic configurable interface serving as a protocol interpreter of the protocol of a telephone switch thereby enabling communication between said switch and a communication device, the data structure having entries wherein each entry contains a representation of the state of the communication device as known to the telephone switch at any given time.



THE CLAIMS

1. In a communication system comprising at least one telephone switch and at least one communication device: a virtual phone generic configurable interface between said telephone switch and said communication device to serve as a protocol interpreter of the protocol of said telephone switch and to convert the protocol of said telephone switch and the protocols of applications associated with the operation of said switch and said communication device into a common format to enable communication between said telephone switch and said communication device.

2. A system according to claim 1, wherein said virtual phone generic configurable interface includes a set of virtual phone data structures to represent the state of a phone as known to the telephone switch at any given time.

3. A system according to claim 1, wherein said virtual phone generic configurable interface includes a virtual phone application program interface to provide data communication between said telephone switch and said communication device.

4. A system according to claim 1, wherein said virtual phone generic configurable interface includes a component to provide a communications protocol for the transfer of phone control information between said telephone switch and said communication device.

5. A system according to claim 1, wherein said virtual phone generic configurable interface comprises:

a) a set of virtual phone data structures to represent the state of a phone as known to the telephone switch at any given time; and

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b) a program interface to access said data structures.

6. A system according to claim 5, wherein said program interface to access said data structures comprises a virtual phone application program interface to provide data communication between said set of virtual phone data structures and said switch and said communication device.

7. In a telephone communication system comprising at least one telephone switch, at least one telephone and a computer to process applications related to the operation of said telephone switch and said telephone: a virtual phone generic configurable interface to serve as a protocol interpreter between protocols of said telephone switch and protocols of said applications to convert the protocols of said telephone switch and the protocols of said applications into a common format to enable communication between said telephone switch and said telephone.

8. A system according to claim 7, wherein said virtual phone generic interface comprises:

a) a set of virtual phone data structures to represent the state of a phone as known to the telephone switch at any given time;

b) a program interface to access said data structures; and

c) a protocol to establish communication between said computer and said data structures.

9. A system according to claim 8, wherein said program interface to access said data structures comprises:

a) an internal virtual phone application program interface to provide data communication between said set of

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virtual phone data structures and said telephone switch and said telephone; and

b) an external virtual phone application program interface to provide data communication between said set of virtual phone data structures and said computer.

10. A system according to claim 9, further including a communications protocol to provide communication between said external virtual phone application program interface and said computer.

15. A method for providing communication in a system comprising at least one telephone switch and at least one communication device, said method comprising:

a) providing a virtual phone generic configurable interface to serve as a protocol interpreter of the protocol of said telephone switch; and

b) utilizing said virtual phone generic configurable interface to convert the protocol of said telephone switch and the protocols of applications associated with the operation of said telephone switch and said communication device into a common format to enable communication between said telephone switch and said communication device.

16. A method according to claim 15, wherein said providing a virtual phone generic configurable interface comprises providing a set of virtual phone data structures for representing the state of a phone as known to the telephone switch at any given time.

17. A method according to claim 15, wherein said providing a virtual phone generic configurable interface comprises providing a virtual phone application program

interface for providing data communication between said telephone switch and said communication device.

18. A method according to claim 15, wherein said providing a virtual phone generic configurable interface comprises:

- a) providing a set of virtual phone data structures for representing the state of a phone as known to the telephone switch at any given time; and
- b) providing a program interface for accessing said structures.

19. A method according to claim 18, wherein said providing a program interface for accessing said data structures comprises providing a virtual phone application program interface for providing data communication between said set of virtual phone data structures and said switch and said communication device.

29. In a communication system comprising at least one communication switch and at least one communication device: a media control proxy to serve as a gateway between said communication switch and said communication device to bridge any gap in communication protocols between said communication switch and said communication device and to convert said communication protocols to a common format to enable communication between said communication switch and said communication device.

30. A system according to claim 29, wherein said media control proxy includes a component to convert a fixed control protocol of an original connection between said communication switch and said communication device to a communications method for supporting any given communication device.

31. A system according to claim 29, wherein a first data bearer channel and a first control channel each are connected to said communication switch and to said media control proxy and a second data bearer channel and a second control channel are connected to said media control proxy and to said communication device.

32. A system according to claim 31, wherein said media control proxy includes a component to pass through data on said first and second data bearer channels.

33. A system according to claim 31, wherein said media control proxy includes a processor to process information on said first and second control channels for conversion to a protocol understood by said communications device.

34. A method for providing communication in a system comprising at least one communication switch and at least one communication device, said method comprising:

a) providing a media control proxy to serve as a gateway between said communication switch and said communication device to bridge any gap in communication protocols between said communication switch and said communication device and to convert said communication protocols to a common format; and

b) utilizing said media control proxy to enable communication between said communication switch and said communication device.

35. A method according to claim 34, wherein said providing a media control proxy comprises connecting a fixed control protocol of an original connection between said communication switch and said communication device to a

communications method for supporting any given communication device.

36. A method according to claim 34, wherein said providing a media control proxy comprises passing through bearer channel data between said communication switch and said communication device.

37. A method according to claim 34, wherein said providing a media control proxy comprises processing control information from said communication switch for conversion to a protocol understood by said communication device.

38. A method according to claim 34, wherein said providing a media control proxy comprises interpreting control information received from said communication switch and maintaining the state of the communication device as defined by the communication switch.

39. A method according to claim 34, wherein said providing a media control proxy comprises transmitting data to said communication switch on a control channel between said media control proxy and said communication switch in a protocol native to said communication switch so that said communication switch interprets a message from said media control proxy as a message from said communication device.